

Overview: EVR Balance Total System

- The VST ECS membrane *Processor* does not interact directly with the other balance system hardware. It is in place to monitor and control the pressure in the UST to within limits specified by CARB.

Under conditions where the GDF is operational and the balance system hardware is functioning normally, the inherent ORVR compatibility of the balance system (when using VST's ENVIRO-LOC nozzle) will produce a predominately negative gauge pressure in the ullage space of the UST. Under these conditions the ECS membrane *Processor* will typically not need to operate.

During periods of less activity, the GDF being shut down overnight, winter fuels being present, or other conditions that promote the pressurization of the ullage space, the ECS membrane *Processor* will operate as needed to control the pressure in the ullage space to an accepted level. The ECS membrane *Processor* will turn on at an ullage pressure of +0.20 inches of water and turn it off at a pressure of -0.20 inches of water. Currently, the ECS membrane *Processor* unit is monitored and controlled through the PMC or ISD software.

- The ECS membrane *Processor* uses a type of membrane technology to enable it to selectively separate the components in the ullage vapor mixture.

Through a somewhat complex transport means, certain molecules will selectively travel in a stream from one side of the membrane to the other. This stream is referred to as the permeate stream.

In this case, predominate molecules transported across the membrane will be the primary constituents of air, which are oxygen, nitrogen, and water vapor. A small amount of the hydrocarbons present in the ullage mixture will also migrate across the membrane. Typically, permeate will contain less than 3.0% hydrocarbons. The result of this activity includes, fresh air vented to atmosphere, hydrocarbon vapors returned to the UST, and UST pressurization controlled to an acceptable level.

- The process of separation by the membrane is made possible by using two pumps, one low-pressure pump which circulates the ullage vapor mixture along one side of the membrane, and one high-vacuum pump, which creates the pressure differential needed to cause the permeate transport across the membrane. These are the only moving parts in the system.

Overview of How the VST Membrane Processor Operates

- The Processor is a technology created for Gasoline Dispensing Facilities (GDF) to assist them in reducing the number of harmful emissions released to the atmosphere through the natural occurrence of gasoline vaporization.
- The table below lists the steps that the Veeder-Root TLS 350 and the software takes to control the Processor.

1.	<ul style="list-style-type: none"> • When the UST system pressure rises above +0.2"WC, the <i>Processor</i> turns ON.
2.	<ul style="list-style-type: none"> • Through the vapor inlet pipe connection at the <i>Processor</i>, the VOC vapor is drawn into the suction side of the blower.
3.	<ul style="list-style-type: none"> • The blower discharges the VOC vapor into the membrane housing.
4.	<ul style="list-style-type: none"> • Inside the membrane housing, the VOC vapor is separated in to two air streams: VOC depleted air (referred to as "air") Gasoline VOC vapor • The membrane is designed specifically for separating air from gasoline VOC vapor.
5.	<ul style="list-style-type: none"> • A vacuum pump draws the air from the membrane housing through a check valve.
6.	<ul style="list-style-type: none"> • A sample of the air flows through a hydrocarbon sensor to check the percent hydrocarbons.
7.	<ul style="list-style-type: none"> • From the vacuum pump, the air is vented to atmosphere via the air return.
8.	<ul style="list-style-type: none"> • The gasoline VOC vapor returns to the UST system via the vapor return.
9.	<ul style="list-style-type: none"> • When the UST system pressure drops below -0.2"WC, the <i>Processor</i> turns OFF.

Overview of How the VR Polisher Operates

The Veeder-Root Vapor Pressure Management System is a substitute for the VST ECS Membrane Processor. A balance EVR system using the Veeder-Root Vapor Polisher is used in conjunction with certified hanging hardware to provide pressure management for fuel retail stations.

HOW THE SYSTEM WORKS

The Veeder-Root Vapor Polisher mounts directly onto the station's existing vent riser, utilizing a single tap into the vapor space of the containment system. The canister contains activated 'high capacity' carbon that filters emissions that enter through an inlet at the bottom of the canister from the vent pipe. The outlet at the top of the carbon canister releases cleansed air into the atmosphere reducing the pressure in the underground storage tank. This outlet is controlled by a valve controlled by the TLS-350. The operation of the vapor polisher is continuously monitored through an electronic control module that is interfaced to the TLS-350 via an intrinsically-safe electrical connection.

HOW THE SYSTEM OPERATES

When the UST pressure goes positive	<ul style="list-style-type: none">• The TLS 350 opens the valve on the output port of the canister allowing vapor to enter the canister• As vapor flows through the canister, active carbon inside captures the hydrocarbon vapors allowing clean air to exit the canister• Pressure in the UST falls
When the UST pressure goes negative	<ul style="list-style-type: none">• The TLS 350 opens the valve on the output port of the canister allowing fresh air to enter the canister• As the fresh air passes through the canister, the hydrocarbons are removed from the carbon and returned to the UST.• Evaporative loss is reduced

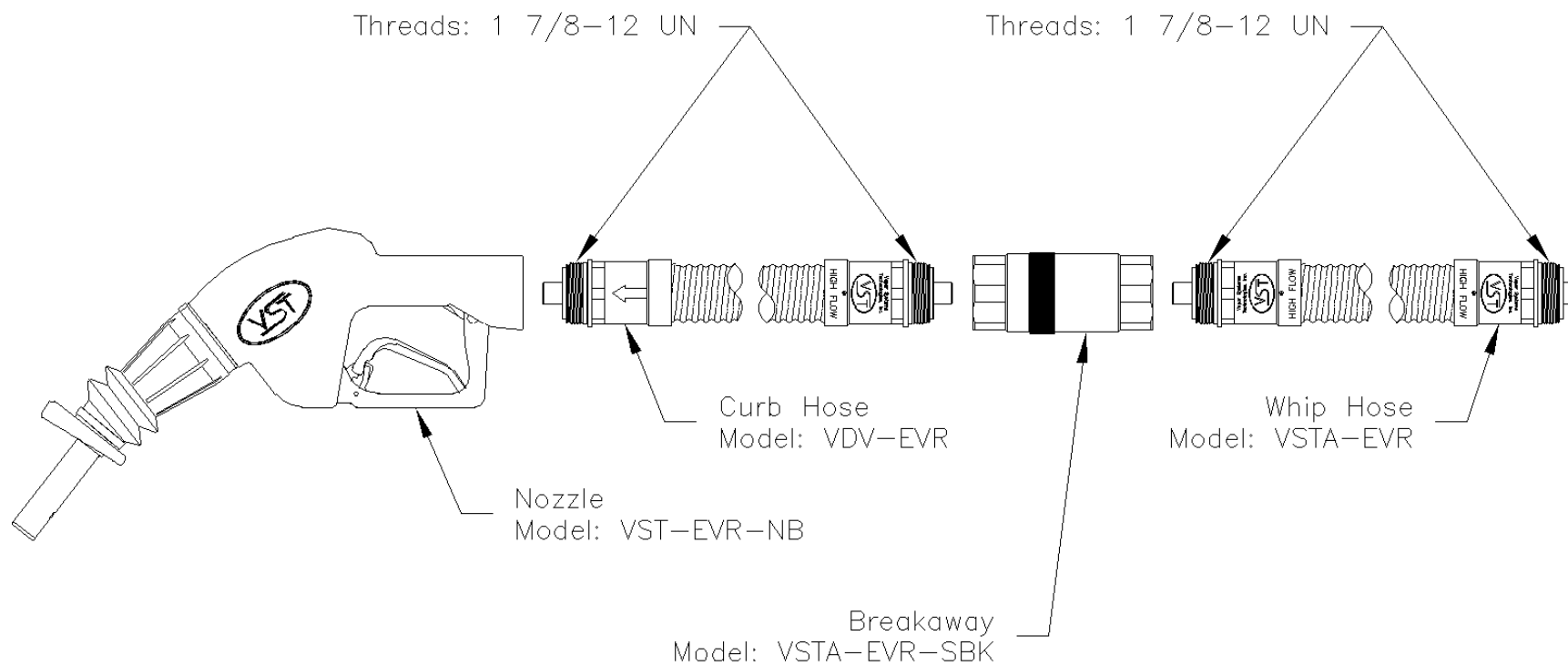


Figure 1: VST Hanging Hardware
(Nozzle, Coaxial Curb Hose, Breakaway, and Coaxial Whip Hose)

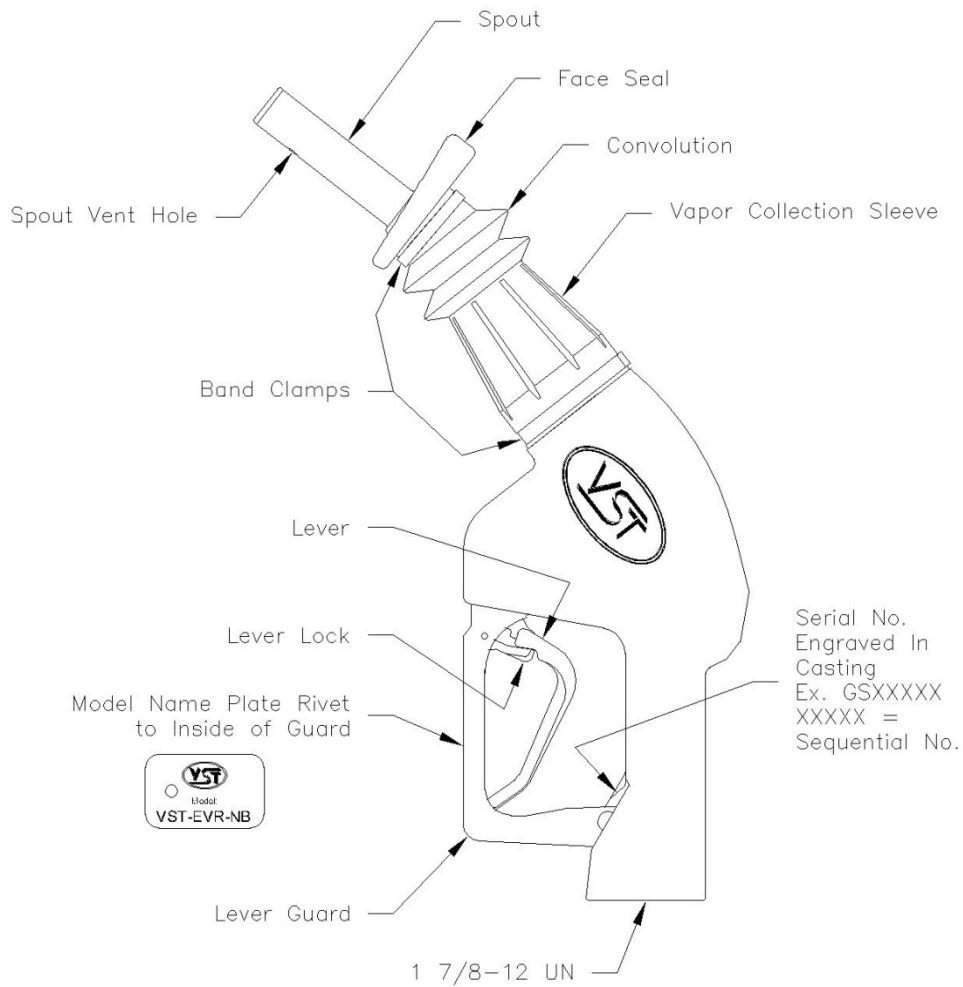
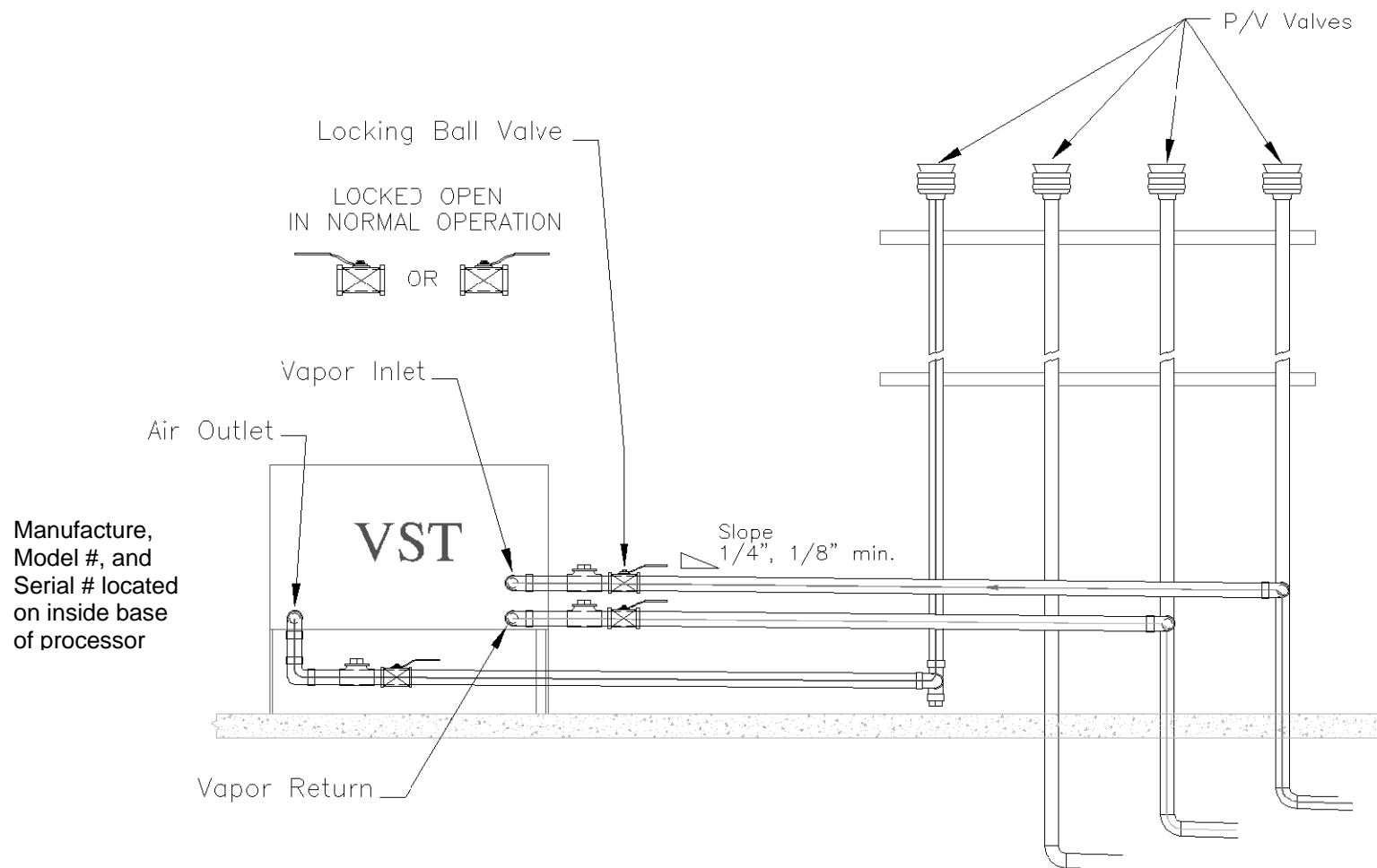


Figure 2: Model VST-EVR-NB Nozzle



CAUTION: THE HANDLES ON THE LOCKING BALL VALVES MUST NOT BE REMOVED.

Figure 3: Model VST-ECS-CS3 Membrane Processor